Bean Road Tunnel

Construction Dust Assessment – Review Under New Guidance

MARCH 2024

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Version Control

Issue	Revision No.	Date Issued	Author	Checker	Reviewed By
01	1	04/03/2024	AR	PM	PM

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Contents

Acronyms and Abbreviations 5
Outline of Report 6
Guidance update 7
Updates to the assessment 8
Summary 9

Tables

Table 1 – Updated Proposed Dust Mitigation Measures based on the Updated IAQM Construction Dust Guidance 9
Table 2 Construction Dust - Sensitivity of the Area to Dust Soiling Effects on People and Property ... 16
Table 3 Construction Dust - Sensitivity of the Area to Human Health Impacts 17
Table 4 Construction Dust - Sensitivity of the Area to Ecological Impacts 18
Table 5 Construction Dust - Dust Risk Category from Demolition Activities 18
Table 6 Construction Dust - Dust Risk Category from Earthworks and Construction Activities 18
Table 7 Construction Dust - Dust Risk Category from Trackout Activities 19

Appendices

Appendix A – Construction Dust Assessment Methodology 13

Acronyms and Abbreviations

HGV	Heavy Good Vehicle	PM10	Particulate matter less than 10 microns in aerodynamic diameter
IAQM	Institute of Air Quality Management		

Outline of Report

1.1.1 Arcadis has been commissioned to review a construction dust assessment for the Bean Road Tunnel, henceforth referred to as the 'Proposed Development'. The new tunnel, and associated road works for bus, cycling and pedestrian access, aims to link the east of the Bluewater Shopping Centre to the Eastern Quarry which is being developed as part of the Ebbsfleet Garden City. The tunnel will be built through a chalk spine which separates the Bluewater Shopping Centre and the Eastern Quarry, upon which the B255 runs on.

1.1.2 The construction dust assessment for the proposed development was completed by Jacobs in 2019 for Kent County Council and concluded that the proposed development would have "Negligible risk to sensitive human receptors with regard to dust soiling and human health effects from earthworks, construction and trackout activities". Low level mitigation measures were recommended to ensure best practice during the construction phase and to ensure the likely effect of dust emissions on human health and amenity sites would be insignificant.

1.1.3 The assessment was able to screen out the potential effects of construction dust on ecological sites due to there being no ecological sites within the study area of the assessment.

1.1.4 There are no demolition activities taking place on site, so the potential effects of dust generated by activities associated with demolition were screened out of the assessment.

1.1.5 Since the submission of the original construction dust assessment, the Institute of Air Quality Management (IAQM) has updated the Assessment of Dust from Demolition and Construction (2024) guidance paper. The guidance paper was updated to adopt lessons learnt from the application of the previous guidance paper which was published in 2014.

1.1.6 It is best practice to review the proposed development under the updated guidance to ensure that the conclusions made in the 2019 construction dust assessment remain the same, particularly with regards to the mitigation measures required. It is possible that under the new guidance, what was once deemed a low risk can now be classified as a medium risk for example. This document will outline the notable changes in the updated IAQM guidance paper, how this may apply to proposed development and whether these changes impact the conclusions made in the 2019 assessment.

1.1.7 The following documents and guidance papers will be referred to throughout this document:

- IAQM, Assessment of dust from demolition and construction (2024) V2.2
  - (Henceforth referred to as the 'new guidance')
- IAQM, Assessment of dust from demolition and construction (2014)
  - (Henceforth referred to as the 'previous guidance')
- Jacobs, Bean Road Tunnel, Planning and Design and Access Statement (2019)
  - (Henceforth referred to as the 'previous assessment')

Guidance update

1.1.8 The IAQM updated several sections of the guidance paper. The updates which are notable to this construction dust assessment review are outlined below:

- The screening criteria for human and ecological receptors have been updated. The previous guidance required screening of receptors up to 350m away from the source of emissions. In the updated guidance, it is now required to screen receptors up to 250m away from the source of emissions. Potential human and ecological receptors will be reassessed under the new screening criteria.
- The definitions for the size of potential dust emission magnitudes for demolition, earthworks and construction activities have changed. The construction data provided for the proposed development will be reassessed against the new criteria.
- The criteria to assess the risk of dust impacts for Trackout activities has been altered, and now considers medium dust emission magnitudes in an area of medium sensitivity to be classified as a medium risk, whereas it was previously classed as a low risk.
- Mitigation Measure 12 "*Agree dust deposition, dust flux, or real-time PM10 continuous monitoring locations with the Local Authority. Where possible commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.*" is now 'Highly Recommended' for all schemes, regardless of the risk for dust impacts.
- Mitigation Measure 24 "*Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials*." is now not required for low and medium schemes.

1.1.9 These changes to the IAQM guidance paper will be considered against the data provided for the proposed development. The following section outlines the changes to the findings of the previous assessment under the new guidance.

Updates to the assessment

1.1.10 An evaluation of the previous report, the construction data provided and the proposed development site under the new guidance has led to some alterations to the assessment results and therefore the mitigation measures required. These changes are outlined below. Appendix A contains the methodology of the construction dust assessment under the new guidance, including the criteria tables that are referred to throughout this section.

1.1.11 The development of the Ashmere housing development will introduce high sensitivity receptors near to the proposed development's construction site. These receptors were not considered in the previous assessment, however construction of the housing development is ongoing. The introduction of these receptors need to be considered with the assessment. It is unclear as to whether the houses in the Ashmore housing development will be occupied or not during the construction of the proposed development, but in this case they are considered to be occupied to provide a worst case scenario. As a result of this, the sensitivity of the area to dust soiling effects from trackout activities is upgraded from low to medium. This is because there are multiple high sensitivity receptors located within 50m of the likely trackout route. The sensitivity of the area to dust soiling effects with respects to earthworks and construction remains low as per the previous assessment. The sensitivity of the area to human health impacts remains low for all three activities as the annual mean PM_{10} concentration in the area is well below the threshold for it to be considered a medium risk.

1.1.12 Table 4 in the previous assessment presented the dust emission magnitude for each activity based on criteria set out under the previous guidance. It presented the Dust Emissions Magnitude for Earthworks, Construction and Trackout as 'small'. A review of the construction data under new guidance found the dust emissions magnitude associated with **Earthworks and Construction** activities to be '**Medium'** and **Trackout** to be '**Large'**.

1.1.13 Table 6 in the previous assessment provided a summary of the dust risks for human receptors. For the potential impacts on dust soiling and human health, the risk from activities associated with Earthworks, Construction and Trackout were found to be 'Negligible'. Under new guidance, the risk from activities associated with **Earthworks and Construction** are considered to be **low**, while for **Trackout** there is a **medium risk** of dust impacts. This upgrade from a negligible risk to a medium risk for trackout is a result of the upgrade of the potential dust emissions magnitude from small to large, as well as the Ashmere housing development introducing multiple, high sensitivity receptors within 50m of the likely trackout route that will be used by Heavy Goods Vehicles (HGVs).

1.1.14 The upgrade to a medium risk of dust impacts associated to Trackout activities means that the appropriate mitigation measures that should be applied have changed. General mitigation measures, as well as mitigation measures that are specific to Trackout now need to follow the **medium risk** category of mitigation measures. The risk of dust impacts from earthworks and construction was negligible previously and is now considered to be low, however, this does not change the mitigation measures required with regards to these elements of construction.

1.1.15 In Table 8 in the previous assessment, Mitigation Measure 12 "Agree real-time PM10 continuous monitoring locations with the local authority" was 'not required' under the previous guidance paper, however it is now '**Highly Recommended**' under the new guidance.

Summary

1.1.16 Despite the changes to the assessment outlined in the previous section, under the new guidance the overall risk of impacts from Earthworks and Construction is still low. The risk of impacts associated with Trackout however has been upgraded from negligible to medium. This upgrade is a result of the increase in the dust emission magnitude for Trackout activities, as well as the introduction of high sensitivity receptors within 50m of the trackout route, due to the construction of the Ashmere housing development.

1.1.17 The risk of unmitigated dust effects attributed to the proposed development is now considered to be medium, whereas in the previous assessment it was considered to be low. As a result of this, the appropriate mitigation measures to ensure there are no significant effects to local air quality have changed.

1.1.18 Medium risk mitigation measures are now recommended for the proposed development, with the exception of specific earthworks and construction mitigation measures which can remain under the low-risk mitigation measures.

1.1.19 Table 1 below shows the mitigation measures that are recommended for the proposed development under the new guidance. These mitigation measures have the potential to reduce impacts as a result of fugitive dust emissions during the construction phase and ensure that significant adverse effects do not occur at receptors.

Table 1 – Updated Proposed Dust Mitigation Measures based on the Updated IAQM Construction Dust Guidance

Mitigation Measure	Medium Risk Measures H=Highly Recommended D=Desirable
Communications	
Develop and implement a stakeholder communications plan that includes community engagement before work commences on site.	H
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.	H
Display the head or regional office contact information.	H
Dust Management	
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the Local Authority.	H
Site Management	
Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken.	H

Make the complaints log available to the local authority when asked.	H
Record any exceptional incidents that cause dust and/or air emissions, either on- or off-site, and the action taken to resolve the situation in the log book.	H
Monitoring	
Undertake daily on-site and off-site inspection, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to the Local Authority when asked. This should include regular dust soiling checks of surfaces such as street furniture, cars and window sills within 100m of site boundary, with cleaning to be provided if necessary.	D
Carry out regular site inspections to monitor compliance with the DMP, record inspection results, and make an inspection log available to the local authority when asked.	H
Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.	H
Agree dust deposition, dust flux, or real-time PM_{10} continuous monitoring locations with the Local Authority. Where possible, commence baseline monitoring at least three months before work commences on site or, if it a large site, before work on a phase commences. Further guidance is provided by IAQM on monitoring during demolition, earthworks and construction.	H
Preparing and maintaining the site	
Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible.	H
Erect solid screens or barriers around dusty activities or the site boundary so that are at least as high as any stockpiles on site.	H
Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period.	H
Avoid site runoff of water or mud.	H
Keep site fencing, barriers and scaffolding clean using wet methods.	H
Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site, cover as described below.	H
Cover, seed or fence stockpiles to prevent wind whipping.	H
Operating vehicle/machinery and sustainable travel	
Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone and the London NRMM standards, where applicable	H
Ensure all vehicles switch off engines when stationary - no idling vehicles.	H
Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.	H

Impose and signpost a maximum-speed-limit of 15mph on surfaced and 10mph on unsurfaced haul roads and work areas (if long haul routes are required, these speeds may be increased with suitable additional control measures provided, subject to the approval of the nominated undertaker and with the agreement of the Local Authority, where appropriate).	D
Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).	D
Operations	
Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems.	H
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.	H
Use enclosed chutes and conveyors and covered skips.	H
Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.	H
Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.	H
Waste Management	
Avoid bonfires and burning of waste materials.	H
Earthworks	
Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable.	D
Use Hessian, mulches or trackifiers where it is not possible to re-vegetate or cover with topsoil, as soon as practicable.	D
Only remove the cover in small areas during work and not all at once.	D
Construction	
Avoid scabbling (roughening of concrete surfaces) if possible.	D
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.	H
Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.	D
For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.	D
Trackout	

Use water-assisted dust sweeper(s) on the access and local roads, to remove, as necessary, any material tracked out of the site. This may require the sweeper being continuously in use.	H
Avoid dry sweeping of large areas.	H
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.	H
Inspect on-site haul routes for integrity and instigate necessary repairs to the surface as soon as reasonably practicable.	H
Record all inspections of haul routes and any subsequent action in a site log book.	H
Install hard surfaced haul routes, which are regularly damped down with fixed or mobile sprinkler systems, or mobile water bowsers and regularly cleaned.	H
Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).	H
Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits.	H
Access gates to be located at least 10 m from receptors where possible.	H

Appendix A

Construction Dust Risk Assessment Methodology

The dust risk assessment has been carried out in accordance with the Institute of Air Quality Management (IAQM) construction dust guidance (IAQM, 2024).

The steps for assessing dust emissions in accordance with the IAQM construction dust guidance are detailed in the following sections.

Step 1

Step 1 screens the requirement for a more detailed assessment. Should human receptors be identified within 250m of the boundary or 50m from the construction vehicle route up to 250m from the site entrance, then the assessment proceeds to Step 2. Additionally, should ecological receptors be identified within 50m of the site or 50m from the construction vehicle route, then the assessment also proceeds to Step 2.

Should sensitive receptors not be present within the relevant distances then negligible impacts would be expected and further assessment is not necessary.

Step 2

Step 2 assesses the risk of potential dust impacts. A site is allocated a risk category based on two factors:

- The scale and nature of the works, which determines the magnitude of dust arising as: small, medium or large (Step 2A); and,
- The sensitivity of the area to dust impacts, which can be defined as low, medium or high sensitivity (Step 2B).

The two factors are combined in Step 2C to determine the risk of dust impacts without mitigation applied.

Step 2A defines the potential magnitude of dust emission through the construction phase. The relevant criteria are summarised in Table 1.

*Table 1 Construction Dust - Magnitude of Emission (**Error! Reference source not found.**)*

Magnitude	Activity	Criteria
Large	Demolition	Total building volume greater than 75,000m^3 Potentially dusty construction material (e.g. concrete) On-site crushing and screening Demolition activities greater than 12m above ground level
	Earthworks	Total site area greater than 110,000m^2 Potentially dusty soil type (e.g. clay, which will be prone to suspension when dry due to small particle size) More than 10 heavy earth moving vehicles active at any one time Formation of bunds greater than 6m in height

Magnitude	Activity	Criteria
	Construction	Total building volume greater than 75,000m^3 On site concrete batching Sandblasting
	Trackout	More than 50 HDV trips per day Potentially dusty surface material (e.g. high clay content) Unpaved road length greater than 100m
Medium	Demolition	Total building volume 12,000m^3 to 75,000m^3 Potentially dusty construction material Demolition activities 6m to 12m above ground level
	Earthworks	Total site area 18,000m^2 to 110,000m^2 Moderately dusty soil type (e.g. silt) 5 to 10 heavy earth moving vehicles active at any one time Formation of bunds 3m to 6m in height
	Construction	Total building volume 12,000m^3 to 75,000m^3 Potentially dusty construction material (e.g. concrete) On site concrete batching
	Trackout	20 to 50 HDV trips per day Moderately dusty surface material (e.g. high clay content) Unpaved road length 50m to 100m
Small	Demolition	Total building volume under 12,000m^3 Construction material with low potential for dust release (e.g. metal cladding or timber) Demolition activities less than 6m above ground level Demolition during wetter months
	Earthworks	Total site area less than 18,000m^2 Soil type with large grain size (e.g. sand) Less than 5 heavy earth moving vehicles active at any one time Formation of bunds less than 4m in height
	Construction	Total building volume less than 12,000m^3

Magnitude	Activity	Criteria
		Construction material with low potential for dust release (e.g. metal cladding or timber)
	Trackout	Less than 20 HDV trips per day Surface material with low potential for dust release Unpaved road length less than 50m

Step 2B defines the sensitivity of the area around the proposed Project to potential dust impacts. The influencing factors are shown in Table 2.

Table 2 Construction Dust - Examples of Factors Defining Sensitivity of an Area

Receptor Sensitivity	Examples	
	Human Receptors	Ecological Receptors
High	Users expect of high levels of amenity. High aesthetic or value property. People expected to be present continuously for extended periods of time. Locations where members of the public are exposed over a time period relevant to the air quality objective for particulate matter less than 10 microns in diameter (PM_{10}). e.g. residential properties, hospitals, schools and residential care homes.	Internationally or nationally designated site e.g. Special Area of Conservation, and the designated features may be affected by dust soiling. Locations where there is a community of a particular dust sensitive species such as vascular species included in the Red Data List for Great Britain.
Medium	Users would expect to enjoy a reasonable level of amenity. Aesthetics or value of their property could be diminished by soiling. People or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land e.g. parks and places of work.	Nationally designated site e.g. Sites of Special Scientific Interest with dust sensitive features. Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown.
Low	Enjoyment of amenity would not reasonably be expected.	Locally designated site e.g. Local Nature Reserve where the

Receptor Sensitivity	Examples	
	Human Receptors	Ecological Receptors
	Property would not be expected to be diminished in appearance. Transient exposure, where people would only be expected to be present for limited periods. e.g. public footpaths, playing fields, shopping streets, playing fields, farmland, footpaths, short term car park and roads.	features may be affected by dust deposition.

The guidance also provides the following factors to consider when determining the sensitivity of an area to potential dust impacts:

- Any history of dust generating activities in the area;
- The likelihood of concurrent dust generating activity on nearby sites;
- Any pre-existing screening between the source and receptors;
- Any conclusions drawn from analysing local meteorological data which accurately represent the area; and if relevant the season during which works will take place;
- Any conclusions drawn from local topography;
- Duration of the potential impact, as a receptor may become more sensitive over time; and,
- Any known specific receptor sensitivities which go beyond the classifications given in the document.

These factors were considered during the undertaking of the assessment.

The criteria for determining the sensitivity of the area to dust soiling effects on people and property is summarised in **Error! Reference source not found.**.

Table 2 Construction Dust - Sensitivity of the Area to Dust Soiling Effects on People and Property

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		Less than 20	Less than 50	Less than 100	Less than 250
High	More than 100	High	High	Medium	Low
	10 - 100	High	Medium	Low	Low
	1 - 10	Medium	Low	Low	Low
Medium	More than 1	Medium	Low	Low	Low
Low	More than 1	Low	Low	Low	Low

Error! Reference source not found. outlines the criteria for determining the sensitivity of the area to human health impacts.

Table 3 Construction Dust - Sensitivity of the Area to Human Health Impacts

Receptor Sensitivity	Annual Mean PM10 Conc.	Number of Receptors	Distance from the Source (m)			
			Less than 20	Less than 50	Less than 100	Less than 250
High	Greater than 32µg/m^3	More than 100	High	High	High	Medium
		10 - 100	High	High	Medium	Low
		1 - 10	High	Medium	Low	Low
	28-32µg/m^3	More than 100	High	High	Medium	Low
		10 - 100	High	Medium	Low	Low
		1 - 10	High	Medium	Low	Low
	24-28µg/m^3	More than 100	High	Medium	Low	Low
		10 - 100	High	Medium	Low	Low
		1 - 10	Medium	Low	Low	Low
	Less than 24µg/m^3	More than 100	Medium	Low	Low	Low
		10 - 100	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low
Medium	Greater than 32µg/m^3	More than 10	High	Medium	Low	Low
		1 - 10	Medium	Low	Low	Low
	28-32µg/m^3	More than 10	Medium	Low	Low	Low
		1 - 10	Low	Low	Low	Low
	24-28µg/m^3	More than 10	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low
	Less than 24µg/m^3	More than 10	Low	Low	Low	Low

Receptor Sensitivity	Annual Mean PM10 Conc.	Number of Receptors	Distance from the Source (m)			
			Less than 20	Less than 50	Less than 100	Less than 250
		1 - 10	Low	Low	Low	Low
Low	-	More than 1	Low	Low	Low	Low

Error! Reference source not found. outlines the criteria for determining the sensitivity of the area to ecological impacts.

Table 4 Construction Dust - Sensitivity of the Area to Ecological Impacts

Receptor Sensitivity	Distance from the Source (m)	
	Less than 20	Less than 50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Step 2C combines the dust emission magnitude with the sensitivity of the area to determine the risk of unmitigated impacts.

Error! Reference source not found. outlines the risk category from demolition activities.

Table 5 Construction Dust - Dust Risk Category from Demolition Activities

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Medium
Medium	High	Medium	Low
Low	Medium	Low	Negligible

Error! Reference source not found. outlines the risk category from earthworks and construction activities.

Table 6 Construction Dust - Dust Risk Category from Earthworks and Construction Activities

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Medium	Low
Low	Low	Low	Negligible

Error! Reference source not found. outlines the risk category from trackout activities.

Receptor Sensitivity	Dust Emission Magnitude		
	Large	Medium	Small
High	High	Medium	Low
Medium	Medium	Medium	Low
Low	Low	Low	Negligible

Table 7 Construction Dust - Dust Risk Category from Trackout Activities

Step 3

Step 3 requires the identification of site-specific mitigation measures within the guidance to reduce potential dust impacts based upon the relevant risk categories identified in Step 2. For sites with negligible risk, mitigation measures beyond those required by legislation are not required. However, additional controls may be applied as part of good practice.

Step 4

Once the risk of dust impacts has been determined and the appropriate mitigation measures identified, the final step is to determine the significance of any residual impacts. For almost all construction activity, the aim should be to control effects using effective mitigation. Experience shows that this is normally possible, hence the residual effect will normally be not significant.

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